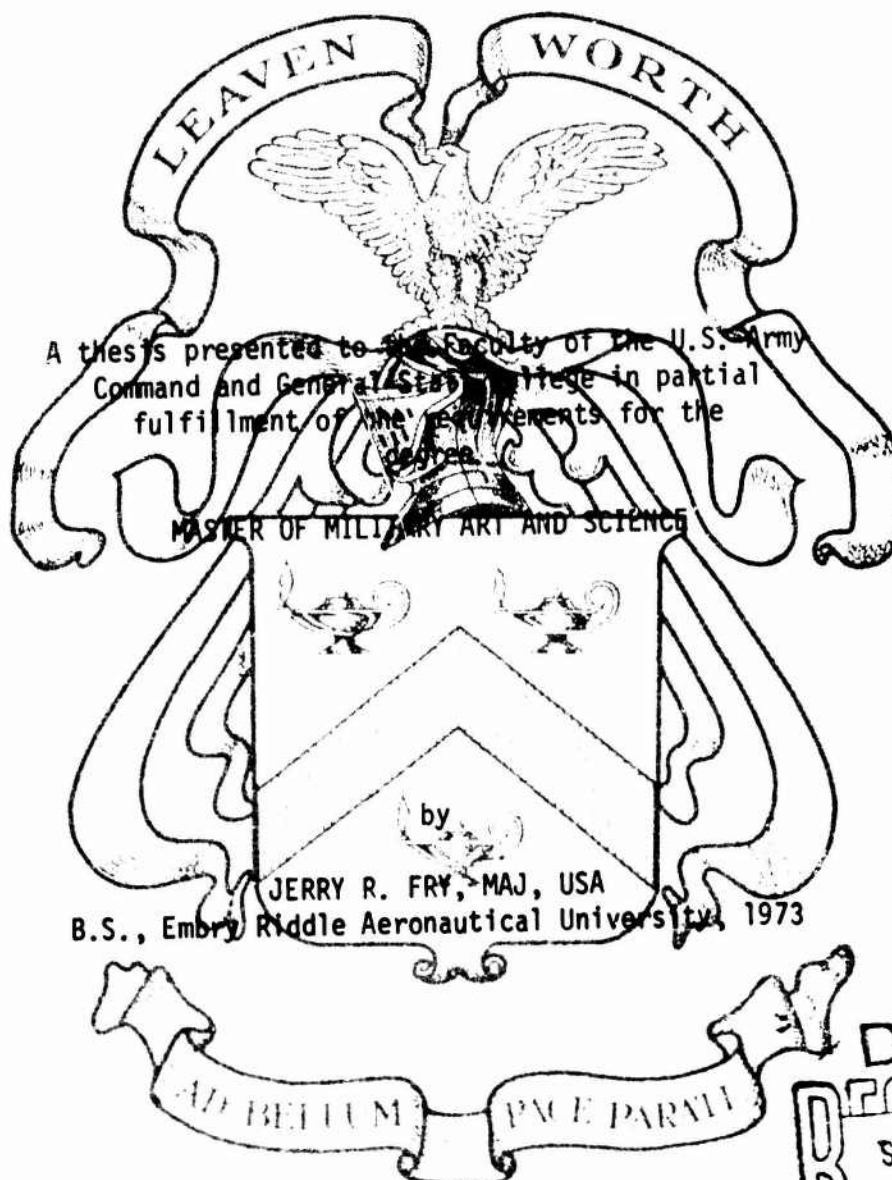


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USE AND TESTING OF THE MOTORCYCLE BY THE US ARMY

APRIL 1917 TO FEBRUARY 1977



Fort Leavenworth, Kansas  
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Use and Testing of the Motorcycle by the US Army, April 1917 to  
February 1977

Jerry R. Fry, MAJ, USA  
U.S. Army Command and General Staff College  
Fort Leavenworth, Kansas 66027

Final report 10 June 1977

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A Master of Military Art and Science thesis presented to the faculty of  
the U.S. Army Command and General Staff College, Fort Leavenworth,  
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Testing of the motorcycle has continued since 1972 and has included tests by tactical units and the Armor School. The results of this testing and a survey of foreign armies indicate the motorcycle is suited for use as a messenger vehicle, traffic control vehicle, and scout transporter. However, only the use of the motorcycle as a scout transporter has made any progress along the acquisition cycle.

The Infantry School has scheduled the testing of a scout motorcycle in June 1977. This test and other testing have overlooked the obvious potential and capability of the motorcycle as a messenger and traffic control vehicle. Thus the military value of the modern motorcycle has been recognized, but the US Army has failed to address the issue of total user requirements.

USE AND TESTING OF THE MOTORCYCLE BY THE US ARMY

APRIL 1917 TO FEBRUARY 1977

A thesis presented to the Faculty of the U.S. Army  
Command and General Staff College in partial  
fulfillment of the requirements for the  
degree

MASTER OF MILITARY ART AND SCIENCE

by

JERRY R. FRY, MAJ, USA  
B.S., Embry Riddle Aeronautical University, 1973

Fort Leavenworth, Kansas  
1977

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The opinions and conclusions expressed herein are those of the individual student author and do not necessarily represent the views of either the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

## ABSTRACT

The purpose of this thesis is to evaluate the use and testing of the motorcycle by the US Army from April 1917 to February 1977. Procurement of the early military motorcycle for tactical operations ceased in 1939 because it could not operate off the road and was mechanically unreliable.

In early 1972 the Modern Army Selected System, Test Evaluation and Review (MASSTER) began testing the modern motorcycle. It found that the problems experienced with the early motorcycle had been eliminated and that the modern motorcycle had considerable military potential. As a result of this testing, MASSTER recommended that the motorcycle be returned to the Army inventory as a scout and traffic control vehicle. Department of the Army believed the test was inconclusive and disapproved the recommendation.

Testing of the motorcycle has continued since 1972 and has included tests by tactical units and the Armor School. The results of this testing and a survey of foreign armies indicate the motorcycle is suited for use as a messenger vehicle, traffic control vehicle, and scout transporter. However, only the use of the motorcycle as a scout transporter has made any progress along the acquisition cycle.

The Infantry School has scheduled the testing of a scout

motorcycle in June 1977. This test and other testing have overlooked the obvious potential and capability of the motorcycle as a messenger and traffic control vehicle. Thus the military value of the modern motorcycle has been recognized, but the US Army has failed to address the issue of total user requirements.



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## INTRODUCTION

The purpose of this study is to analyze the use and testing of the motorcycle by the US Army, April 1917 to February 1977. The results of this analysis are interpreted and evaluated in an attempt to determine if the Army is moving in the right direction in its efforts to evaluate the potential of the motorcycle as a tactical military vehicle.

In 1939 the Army decided to phase the motorcycle out of the inventory because it was not mechanically reliable and was unsuited for off-the-road military operations.<sup>1</sup> A great many technological improvements in the motorcycle since 1939 have eliminated the shortcomings that caused it to be removed from the inventory.<sup>2</sup> The extensive use of the motorcycle in many other armies and its use as an endurance racing vehicle around the world demonstrate that the motorcycle now has both an off-the-road capability and the durability required for military operations. Yet the US Army has been slow to recognize the full military potential of the motorcycle even though it has tested it for more than five years.

This study comprises a historical analysis of the US Army motorcycle from World War I to 1957, early uses of the motorcycle, and removal from the inventory (Chapter I). Chapter II is a detailed examination of the Modern Army Selected System Test, Evaluation and

Review (MASSTER) test to determine the potential of the motorbike\* to enhance the reconnaissance, security, and antitank capabilities of the US Army. This test is also used to determine if advancing technology has eliminated the motorcycle limitations identified in Chapter I. Other tasks, not investigated by MASSTER, that the motorcycle appears to be suited for are examined in Chapter III. Chapter IV is a chronology of US Army testing and evaluation of the motorcycle from the MASSTER test in 1972. Chapter V contains the summary, conclusions, and recommendations of this study.

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\*MASSTER used the term "motorbike" in referring to the vehicle that is commonly referred to as a motorcycle.

## CHAPTER I

### EARLY HISTORY OF THE US ARMY MOTORCYCLE

The US Army first used the motorcycle in combat operations during World War I. Approximately 10,000 motorcycles were in the military inventory, and they were used almost exclusively for courier (messenger) duties. After the war the motorcycle was used primarily as a courier vehicle, a traffic control vehicle, and a reconnaissance or scout vehicle.<sup>1</sup>

A 1932 table of organization authorized 176 motorcycles in the infantry division. The distribution was:<sup>2</sup>

|                               |    |                               |    |
|-------------------------------|----|-------------------------------|----|
| Quartermaster regiment . . .  | 40 | Military police company . . . | 10 |
| Field artillery regiments . . | 43 | Medical detachments . . . . . | 9  |
| Infantry regiments . . . . .  | 28 | Signal company . . . . .      | 6  |
| Engineer combat regiment . .  | 16 | Tank company . . . . .        | 2  |
| Medical regiment . . . . .    | 13 |                               |    |

Even though a civilian type motorcycle was used extensively during World War I, the Army made no attempt to improve its military capability as the Army began to modernize between the wars. The only motorcycles used were off-the-shelf models from the Harley Davidson and Indian Companies. Unfortunately, these vehicles were designed to meet commercial demands for good performance at high speeds on good roads. This they did quite well, but their performance as a tactical vehicle

was unsatisfactory. Weather and terrain conditions often made high speed impractical for military operations. Extended off-the-road operations under adverse conditions at low speeds caused the air-cooled engine to overheat and the vehicle to fail.<sup>3</sup>

The last motorcycle purchased prior to World War II was actually a military version of the Harley Davidson, but it, too, was inadequate. First, the relatively unsophisticated engine was extremely noisy. Second, it weighed more than 450 pounds, making it "hard to handle even under favorable conditions."<sup>4</sup> Off-the-road operation at any speed was almost impossible. A former commander of the US Army First Motorcycle Cavalry Reconnaissance Regiment said:

We ran into three problem areas with motorcycles: First, the motorcycles were made for the road and were too heavy (500 lbs.), to work effectively off the road. Second, employed off-the-road, the cycles could not keep up, and as a result spent the largest amount of their time in the back of a truck. Third, they were not mechanically sound.<sup>5</sup>

Proof that the motorcycles of that era were not mechanically sound is evident in the 6th Cavalry Regiment records of maneuvers conducted in Georgia and Louisiana in the spring of 1940. The 81 motorcycles used covered approximately 4,000 miles. Mechanical problems were summarized as follows:<sup>6</sup>

| <u>Cause of Failure</u>               | <u>Per Cent of<br/>Total Failures</u> |
|---------------------------------------|---------------------------------------|
| Poor design of motorcycle . . . . .   | 53                                    |
| Faulty preventative maintenance . . . | 12                                    |
| Normal wear and tear . . . . .        | 22                                    |
| Miscellaneous . . . . .               | 13                                    |

Not indicated in these statistics is the fact that about half of the engines had to be rebuilt at the end of the maneuvers.<sup>7</sup> The conclusions drawn were:

Motorcycles in their present state of development are entirely unsuited for military purposes, except for use in messenger work, traffic control and the like. Even for these uses they should be radically redesigned.<sup>8</sup>

The cavalry reconnaissance regiments described above were formed in the 1930s in response to the need for a reconnaissance element to replace the horse, which could not keep up with fast-moving motor trucks. When the units were first organized it was believed that the motorcycle had the speed of mechanized cavalry and the cross-country mobility of the horse. As was stated, this did not prove to be the case.<sup>9</sup>

Compounding the problems encountered prior to World War II was the fact that the Army was developing an off-the-road capability for most of its other vehicles by converting them to four-wheel drive. According to Major General George A. Lynch, the overweight motorcycle was the only tactical vehicle in the Army inventory that could not leave the road without a great deal of difficulty. Because the motorcycle could not go where other transportation went, it became practically useless.<sup>10</sup>

In 1939 the Quartermaster Corps convened a board to evaluate the Army's use of motor vehicles. The necessity for the evaluation stemmed from two reasons. First, a large variety of hastily and

randomly purchased vehicles during the rapid mobilization created problems in the "procurement of repair parts." Second, limited funds "required the consolidation [of] vehicles into a small number of major categories." The decision of the board was that the Army should "concentrate on four-wheeled vehicles." This decision resulted primarily from the fact that the board believed the problems presented by the motorcycle were being solved by the new 1/4-ton truck (Jeep). The board's criticisms of the motorcycle were:<sup>11</sup>

1. The weight of the vehicle made it difficult for one man to handle off the road.
2. It was excessively noisy.
3. It had no capability for communication.
4. Night operations under black-out conditions were hazardous for the driver.
5. Its use was limited on ice and snow.
6. It did not have sufficient fire power capability.

The board also offered the following comment:

. . . Upon unanimous recommendation of the principal using services, further procurement of current types of motorcycles beyond those urgently needed for immediate training purposes as traffic-control vehicles . . . [will stop].<sup>12</sup>

Although the 1/4-ton truck was replacing the motorcycle, about 5,000 were used in World War II. This number dwindled to about 1,000 by mid-1950. During the phasing-out period the motorcycle was used exclusively as a courier and traffic control vehicle. With the advent of the "D" series tables of organization and equipment (TOEs) in the "pentomic

era," 1957, the Army eliminated the last few motorcycles from its TOEs.<sup>13</sup>

In retrospect, the reason the motorcycle was removed from the Army inventory was because its development failed to keep pace with other vehicular development. Had research and development actions been aggressively pursued to develop a tactically sound motorcycle that was capable of operating off the road under adverse conditions, it may have remained in the inventory.

Furthermore, during the same timeframe, the Germans developed a motorcycle that was specifically designed for off-the-road military operations. Their vehicle performed so well and the German High Command had so much faith in it that entire infantry battalions were equipped with motorcycles as the principal means of transportation.<sup>14</sup> During the course of World War II the German Army went from 3 motorcycle infantry battalions to 20.<sup>15</sup>



## CHAPTER II

### MASSTER'S MILITARY POTENTIAL TEST OF THE MOTORBIKE

Long after Germany had developed a cross-country motorcycle, a demand for this type of vehicle developed among civilian motorcyclists. The vehicle demanded by the civilian sector was a lightweight, cross-country racing type. As the sport of motorcycle racing progressed, competition among manufacturers provided the catalyst for additional development and refinement. The result of this competition has been the development of an inexpensive, lightweight (200 pounds), highly maneuverable off-the-road vehicle that is easily maintainable and appears to have some potential as a military vehicle.<sup>1</sup>

As a result of interest shown by the Department of the Army in this vehicle, the commanding general of the Modern Army Selected Systems Test, Evaluation and Review (MASSTER) issued verbal instructions for an in-house test to evaluate the military potential of the motorbike.<sup>2</sup>

This chapter deals with that test, its results, and the suitability of the motorcycle as a scout vehicle. The questions it will answer are:

- Is the modern motorcycle capable of performing satisfactorily off the road in a tactical environment?
- Is the modern motorcycle mechanically reliable?

These questions are important because the answers will indicate whether or not the problems experienced with the early military motorcycle have been eliminated by advancing technology.

On 31 January 1972 a Scout Section of the 1st Cavalry Division, Fort Hood, Texas, began a 9-month test and evaluation of the modern motorbike under the direction of MASSTER. The test was to be conducted in three phases: Phase 1, TRICAP I (Triple Capability I), 31 January to 25 February 1972; Phase 2, Gallant Hand, 21-28 March 1972; and Phase 3, Motorbike Potential Test, 12-22 September 1972. The purpose of the test was "to determine, to the extent possible through limited field evaluation, the potential value of motorbikes to enhance the reconnaissance, security, and antitank capability of the Army."<sup>3</sup>

Motorbike operators participated in 101 hours of on-the-job training when assigned to the test platoon. Only seven of these hours were dedicated to operator maintenance because it was believed that the motorbike was relatively easy to maintain. All testing was conducted in a mid-intensity war environment, similar to the European environment, against a threat that was numerically superior in armor and mechanized forces. Sophisticated air defense weapons and night vision devices were used. Air parity was assumed.<sup>4</sup>

In Phase 1, 10 motorbikes were used in a motorbike squad that consisted of three teams of three men each and a squad leader. The missions performed were tank-killer, reconnaissance, harass aggressor rear, rear area security, screening, messenger, and delay. Results

indicated the following:

- The motorbike was capable of transporting the personnel and equipment involved in each mission.
- It had better mobility than other ground vehicles when moving cross-country.
- The motorbike was quiet enough to move within 200 meters (100 meters in other phases) of occupied positions without being detected.
- It demonstrated that operators could engage tanks and escape aggressor retaliation by withdrawing through dense woods.

There were some identified problem areas, such as:<sup>5</sup>

- Loads on some missions exceeded the recommended capacity of commercial shock absorbers.
- Command and control was unsatisfactory because the squad was issued only one AN/PRC-77 radio and the rider had to stop if he wished to transmit.
- Range was not sufficient because the motorbike's fuel capacity was only 1.85 gallons and fuel consumption was 32 miles per gallon.
- A weapon rack had to be developed for transporting the Dragon weapon system and the individual weapon.

During Phase 2 of the evaluation, an entire scout platoon of 33 motorcycles was used. The missions performed were reconnaissance, screening, messenger, and attack. Favorable results indicated a motorbike squad of 10 men could accomplish its mission faster, over greater

distance, and more thoroughly than a dismounted scout platoon of 33 men. Motorbikes could be used successfully to screen the flank of an armor or mechanized unit and were transportable in a variety of helicopters. The conclusions drawn from Phases 1 and 2 were: "The use of motorbikes has considerable military potential and . . . a program to further evaluate conceptual and materiel aspects is required."<sup>6</sup>

Phase 3, the most extensive phase of the MASSTER test, was conducted 5-15 September. A total of 33 motorcycles were operated 891 hours. Significant findings were as follows:<sup>7</sup>

- Six minor breakdowns occurred: a broken clutch, two flat tires, a broken wheel spoke, a fouled spark plug, and a broken handlebar.
- Operators were able to repair all of the breakdowns except the broken handlebar in less than two hours. Even with the breakdowns, the platoon was able to move and continue the mission.

The motorbike scout platoon was tested with an airmobile scout platoon, an armor scout platoon, and an integrated air cavalry platoon that consisted of four light observation helicopters (OH-58s), four Cobra helicopters (AH-1Gs), and two UH-1 helicopters (each with five infantrymen). Each element was tested against a common threat under similar terrain and weather conditions. The airmobile and armor scout platoons were tested first, and the motorbike and integrated air cavalry platoons were tested second. Each test was one week in duration and the schedule and events were the same for both test weeks. This testing was

conducted as a field exercise. Each unit was required to participate in seven events: night raid, zone reconnaissance, day screen, area reconnaissance, day raid, night screen, and antiarmor. Because there was only one test, repetition of the mission and the unit's performance were heavily influenced by individual unit leadership. No comparative analysis was made. The results were:<sup>8</sup>

- a. Motorbikes were transportable in Army rotary wing aircraft.
- b. Motorbikes provide cross-country capability in excess of 16 kilometers per hour during daylight and of approximately 8 kilometers per hour at night. This includes time for observation halts.
- c. Variation between day and night movement rates for motorbikes is caused by the inability of the operator to see bumps, rocks, small ditches, and other terrain irregularities without night vision aids.
- d. The motorbike platoon was capable of conducting some operations without being detected prior to the initiation of friendly force fire.
- e. Problems were experienced in mounting radios and Dragon weapon systems on the motorbikes.
- f. The communication capability of the motorbike platoon was restricted because of an inadequate number of radios, a limited radio range, and an inability to transmit while moving.
- g. The 33 motorbikes used in the test required 117 gallons of MOGAS to operate for approximately 891 motorbike hours.
- h. The motorbikes used in the test were operated for approximately 891 motorbike hours. There was less than 2 hours of maintenance downtime.
- i. Approximately 7 hours of maintenance training were administered by the parent organization. This training was determined to be adequate (operator and maintenance personnel and no school training).

Based on the MASSTER test, several indicators of motorbike

potential were published.<sup>9</sup> These indicators and unique motorbike capabilities are briefly summarized below.

Mobility. The motorbike can transport soldiers over rough terrain as well as other combat vehicles. In addition, the motorbike exceeds other combat vehicles in maneuverability and mobility in heavily wooded areas.

Stealth. The motorbike provides the soldier with a means of stealthy movement. Operators are able to maneuver within 100 meters of personnel without being detected.

Communications. Communications are a recurring problem. Fabrications for most of the shortcomings are recommended, "but the flexibility of operating the radio from a mounted or dismounted position is not easily obtained."<sup>10</sup>

Transportability. Because of its weight, the motorbike is easily transportable by many tactical and strategic aircraft and ground vehicles.

Petroleum, oils, and lubricants. The fuel requirements of the motorbike are insignificant when compared with those of other military vehicles.

Load-carrying capability. With normal resupply, the motorbike operator can carry all required personal gear for daily operations,

i.e., rations, individual weapon, and ammunition. Equipment mounting brackets allow additional equipment, such as the Dragon weapon system, to be carried. However, maneuverability and mobility decrease when the extra load-carrying capability is used.

Operator and maintenance skill level. Operator and maintenance trainees with no prior motorbike experience have little trouble learning to operate and maintain this vehicle.

Maintainability. Because of simple design and reliability, the motorbike has a very low downtime rate. Its availability rate exceeds 95 per cent. In a field environment, the driver can take care of most repairs in only a few minutes.

The MASSTER test also identified some weaknesses with the motorbike. These were:<sup>11</sup>

Firepower potential. Firepower available to the operator is limited by the amount that can be carried. Also, the operator's ability to fire while operating a motorbike is greatly restricted.

Movement during hours of darkness. The operator's ability to operate at night without the use of night vision goggles is limited in varying degrees depending on available light and the type of terrain.

Fording. The motorbike cannot ford a stream that is more than 15 inches deep.

Limited capacity for carrying equipment. Anything in excess of approximately 50 pounds of equipment reduces off-the-road mobility and can interfere with safe operation.

Evaluation of the results of the three phases of the MASSI test concluded that motorbikes "increase the operational capability of selected units" and "are economical to operate and require only limited support for petroleum, oils, lubricants, maintenance, and training."<sup>12</sup>

After reviewing both the advantages and disadvantages of the motorbike, MASSTER determined that the motorbike had definite military potential and recommended that it be added to selected TOEs (see Table 1).

TABLE 1.--Number of Motorbikes Recommended

| Unit  | Type Division |            |          |          |           |
|---|---------------|------------|----------|----------|-----------|
|   | Armor         | Mechanized | Infantry | Airborne | Airmobile |
| Battalion's combat support company and reconnaissance/scout platoon | 6             | 6          | 27       | 15       | 33        |
| Military police company security platoon                            | 39            | 39         | 39       | 39       | 39        |
| Air cavalry troop   | 40            | 40         | 40       | 40       | 40        |
| Cavalry troop   | N/A           | N/A        | N/A      | 12       | 12        |
| Tank company  | 10            | 10         | 10       | N/A      | N/A       |
| Security section (when augmented)                                   |               |            |          |          |           |

SOURCE: Modern Army Selected System Test, Evaluation and Review, "Motorbike Basis of Issue Study" (Fort Hood, Tex., n.d.), pp. 30, 38, 45, 52. (DDC Doc. AD907049.)



Department of the Army (DA) disapproved MASSTER's recommendations on the basis, in part, of the recommendation<sup>13</sup> of the US Army Combined Arms Combat Development Activity (CACDA), Fort Leavenworth, Kansas. The CACDA report to Department of the Army on the findings of the MASSTER test concluded:

The motorbike has potential for tactical and administrative missions under certain circumstances; however, no specific user requirement has been identified and there is insufficient information available to warrant development and fielding of a motorbike at this time without further evaluation and testing by appropriate schools and FORSCOM units.<sup>14</sup>

The CACDA report also stated:

Judgment also indicates some problem areas that must be considered. Limited cargo capacity, driver safety and training, operation on slick and icy roads, and driver comfort in cold weather are all limiting factors to motorbike operation which must be considered.<sup>15</sup>

The DA and CACDA reservations concerning the motorcycle in the scout role appear to be supported by the results of a survey this writer conducted among fifty foreign officers attending the Command and General Staff College. Only 4 per cent of 50 indicated that the motorcycle is used in a scout role in their army, although 94 per cent indicated that their armies did use the motorcycle (see the appendix). Additional support for this concern comes from the 101st Airborne Division (Air Assault), which conducted testing in June and July 1974 and stated in its evaluation:

The ability of the mounted rider to observe was reduced due to the concentration necessary to select a suitable path for the motorbike while traveling cross-country. The rider was also unable to detect nearby enemy activity because of seriously impaired hearing resulting from a combination of vehicle noise and the muffling

effect of safety helmet. . . . Riders were also unable to effectively defend themselves from close range "enemy" action while mounted. The extremely high noise level of these motorbikes, and required operator attention to maintain mobility and balance at low speed, preclude its effectiveness as a reconnaissance vehicle.<sup>16</sup>

DA, CACDA, the 101st Airborne Division (Air Assault), and numerous foreign nations all appear to have concluded that the motorcycle has limitations as a scout vehicle. A motorcycle rider put in a position where he is searching for the enemy and attempting to make contact is not prepared to defend himself if he finds the enemy. The demands placed upon a rider limit his chances of finding the enemy under conditions favorable to his survival.

On the other hand, if the motorcycle is not used to "make contact" but only to transport scout elements, which are currently only footmobile, it may be suitable. A motorcycle rider is obviously in no more danger than an exposed footmounted infantryman. If the scout elements of the light division, which are currently footmounted, use motorcycles as transporters to and from their reconnaissance areas, both their capability and mobility would increase. This, in effect, would increase their combat effectiveness and would reduce the effect of many of the identified problems.

To repeat, the questions to be answered in this chapter were:

- Is the modern motorcycle capable of performing satisfactorily operating off the road in a tactical environment?
- Is the modern motorcycle mechanically reliable?

Based on the results of the MASSTER test, the answer to both questions

is "Yes."

In summary, advancing technology has eliminated the problems associated with the early US Army motorcycle.

## CHAPTER III

### OTHER TASKS FOR THE MOTORCYCLE

The Modern Army Selected System Test, Evaluation and Review (MASSTER) test focused primarily on the reconnaissance, security, and antitank capabilities of the motorcycle. This chapter examines some other tasks for which the motorcycle appears to be suited. The specific potential tasks to be evaluated in this chapter are messenger service and traffic control.

#### Messengers

To examine the need for the motorcycle as a messenger vehicle, we must first examine the communication system available to the commander and how the messenger fits into that system.

FM 100-5, Operations, which "sets forth the basic concept of US Army doctrine," states that our doctrine "demands continuous, reliable, secure communications."<sup>1</sup>

According to FM 24-1, Tactical Communication Doctrine, FM radio, ground and air messenger, and wire are the three sources available to the commander to get "continuous, reliable, secure communications."<sup>2</sup>

The first communication asset we will examine is the FM radio. FM 24-1 states that "FM radio is the principal means of communication

within the brigade."<sup>3</sup> Ideally, each element of the brigade will have a radio, and each radio will work under all conditions. If this were the case, fighting the battle would be much like a war game. Commanders could stay abreast of the situation and reposition units at the critical time to win the battle. Unfortunately, this is not the case. The FM radio has many inherent limitations and is vulnerable to enemy electronic warfare activities. Because of this vulnerability, doctrine requires that commanders be prepared to use alternate means of communications. Specific vulnerabilities and limitations of the FM radio are electronic warfare, electromagnetic pulse (EMP), security, mutual interference, and self-imposed radio silence.

As regards electronic warfare, the Soviet Union "has devoted enormous amounts of equipment and manpower to electronic warfare. They consider the jamming and destruction of our radios . . . an essential part of war." It is probable that the radios used for command and control near the forward edge of the battle area (FEBA) "could be rendered virtually useless."<sup>4</sup>

The EMP is produced by a nuclear detonation and has the capability of damaging equipment up to 3,000 miles from the blast.<sup>5</sup> In The Offensive (A Soviet View), Colonel A. A. Sidorenko says that in future combat the Soviet forces will make extensive use of nuclear weapons.<sup>6</sup> Should this occur, unprotected FM radios will be virtually useless.

According to FM 24-1 :

Radio is the least secure means of communication. It should be

assumed that enemy interception takes place every time a transmitter is placed in operation. Radio security, therefore, is a constant consideration. The enemy obtains information merely by knowing that radios are operating. His analysis of the number of radios in operation, the volume of traffic, or the location of sets can be particularly damaging to friendly forces; therefore, radio transmission may be restricted or prohibited for security reasons.<sup>7</sup>

Because of the enemy's direction-finding capability, a commander may be reluctant to use his radios for fear of giving away his position. Once a position has been identified, massive artillery can be rapidly brought to bear.<sup>8</sup> Also, during moves, a commander will attempt to conceal details of the unit's movement by imposing radio silence.<sup>9</sup>

Range and terrain, while of lesser importance than the limitations and vulnerabilities mentioned above, also may have a degrading effect on FM communication. The planning range for some FM radios is only 8 to 41 kilometers, depending on the specific radio, and it may not be unusual for units to move out of range of their headquarters.<sup>10</sup> Towns, wooded areas, and hilly terrain would be obstacles that interfere with the requirement for having line-of-sight.<sup>11</sup> Thus, during moves necessitated by rapidly developing tactical situations, there is a danger of losing control of combat elements.

The last problem to be discussed will be that of mutual interference caused by the large number of radios found in the forward areas and the requirement for units to share frequencies. The 101st Airborne Division (Air Assault) after action report from REFORGER 76 indicated that "frequency interference problems were prevalent throughout the entire exercise."<sup>12</sup> Because we have this problem in training, when

enemy jamming is not forcing us to use twice as many frequencies, we can expect it to reappear and be compounded in combat.

Even though FM radio is the principal and, by far, the most convenient means of communication, it is still vulnerable, and we must be prepared if it fails. Today's tacticians demonstrate that they recognize the problem when they state in FM 7-30, The Infantry Brigade, that "wire and messengers should be used when the tactical situation allows."<sup>13</sup> FM 71-2, The Tank and Mechanized Infantry Battalion Task Force, reinforces the preceding statement by stating: "Because the enemy uses direction finding (DF) equipment to pinpoint locations of transmitters, electronic devices such as radios . . . are used only when needed . . . use messengers when possible."<sup>14</sup>

With the need for backup systems in mind, attention here is shifted to wire. The following examples from current tactical doctrine are presented to demonstrate the role wire is expected to play during combat operations.

FM 61-100, The Division, states:

The mission assigned to a unit and [the] tactical situation dictate the communication to be used: Offensive operations rely primarily on radio and defensive operations use wire extensively. Multiple means are used when time and the tactical situation permit. Communication security is stressed throughout all operations.<sup>15</sup>

FM 25-2 (TEST), Unit Commander's Guide, states:

Weather, terrain, dispersion, and electronic warfare as well as crowded frequencies have an adverse effect upon FM radio communications. Therefore, landline telephone [wire] is expected to be the primary means of communication available to most units.<sup>16</sup>

FM 24-1 states:

At battalion level and below, wire lines are installed to provide more secure communications for the commander and his staff and to prevent administrative traffic from overloading radio nets required to conduct operations. These lines parallel radio nets and are constructed as soon as the tactical situation, time, and distance permit.<sup>17</sup>

As can be readily seen, doctrine indicates that the commander should use wire whenever the tactical situation allows. With current national strategy indicating that the Army can expect to fight a defensive battle in Europe and with wire being the preferred method of communicating in the defense,<sup>18</sup> one would think we are prepared with the required amount of wire and wire teams. This is not the case. Effective July 1972, Department of the Army directed that:

Mechanized infantry battalions, armor battalions and armored cavalry squadrons are authorized no vehicles for the primary purpose of carrying, laying, and maintaining wire for unit communication. Personnel and wire equipment will be reduced consistent with their reduced wire laying capability.<sup>19</sup>

Based on the preceding excerpt, the identified units lost their capability to comply fully with doctrine. A review of the Restructured Heavy Division showed no improvement. One wire specialist is assigned to each tank and mechanized infantry battalion.<sup>20</sup>

Messenger assets, the third method of tactical communications available to the commander, is the easiest to study because currently there are no dedicated messengers below division level. The same directive that took the wire laying vehicles out of many TOEs removed messengers and messenger vehicles from all divisional units except the signal



battalion.<sup>21</sup> This action was based on the economic constraints of a diminished defense budget and the need to reduce the number of vehicles in the TOEs.<sup>22</sup> One messenger service still available to the division is the air messenger service provided by the division signal battalion. A statement from the after action report of the 101st Airborne Division (Air Assault) for REFORGER 1976 indicates that the air messenger service during combat operations may not be as effective as has been hoped.

The Division air courier system continues to be unsatisfactory. During the entire Reforger exercise units were missed and schedules were not met due to rapid unit displacement and inability to locate concealed units on the ground.<sup>23</sup>

Helicopters will not be able to look for command posts by flying along the FEBA, and command posts may not always be easily accessible to the current family of tracked and wheeled vehicles that could be "drafted" into the role of messenger vehicles. Therefore, we must look for a messenger transporter that can not only do the job but must also be inexpensive enough to prevent costs from being a limiting factor.

As shown in earlier chapters, the motorcycle was used as a messenger transporter during World Wars I and II but was removed from the inventory because of its mechanical limitations. It was also shown that those mechanical limitations have been solved by advancing technology. If this is in fact the case, the motorcycle should again be considered for inclusion in the Army inventory as a messenger transporter. Using the modern motorcycle as a messenger transporter is not a new idea. The appendix shows that a large number of foreign armies use

the motorcycle as a messenger vehicle. In the past few years elements of both the 82d Airborne Division and the 1st Infantry Division have conducted in-house tests of the motorcycle as a messenger transporter and found it effective (see Chapter IV). During REFORGER 75, the 1st Infantry Division took four motorcycles to Germany to test and evaluate them as messenger transporters and as a backup system for the radio. The conclusions of this test were:<sup>24</sup>

a. The employment of the motorcycle courier as a means of communicating would enhance command and control, especially when the following conditions exist:

1. Massive electronic warfare by a sophisticated hostile force.

2. Electronic blackout due to nuclear radiation, terrain features, and electromagnetic interference.

3. Conditions of self-imposed radio silence.

4. A need for the rapid distribution of overlays, operation orders, or other graphic information not electronically transmittable.

5. Lack of roads or rough terrain which would prohibit the use of four-wheeled vehicles to make physical contact between units or command posts.

b. The employment of flexible, responsive motorcycle couriers would provide an excellent secondary or back-up system of communication within modern armies when unfavorable conditions for electronic communication exist. The use of motorcycle couriers would, to some degree, further eliminate the need for additional liaison personnel who currently move by 1/4-ton truck and are largely dependent on a road network or reasonably good terrain.

c. Modification of the current liaison system and the introduction of motorcycle couriers would, over an extended period, prove to be less expensive.

In 1972 the Army lost the majority of its communications backup

systems. Then the October 1973 war in the Middle East proved how important backup systems will be in a modern, electronic warfare intensive environment.<sup>25</sup> Perhaps if a review were made of the threat and the need to be able to communicate in order to implement the doctrine expressed in FM 100-5, backup systems would be reinserted into the inventory so commanders could start preparing their units to operate without over-reliance on the radio.

Proof that our units are not receiving realistic training is the after action report of the 101st Airborne Division (Air Assault) from REFORGER 76. Even though we know the threat has an extensive electronic warfare capability, no aggressor jamming was directed against units of the 101st. During the entire exercise there is no record of a tactical unit being denied use of its radios other than for self-imposed radio silence. During REFORGER 76,<sup>26</sup> it was estimated that the 101st Airborne Division (Air Assault) Army Security Agency element "kept current location/status information on at least 25% and perhaps as much as 70% of the opposing brigade force."<sup>27</sup> The startling fact about this quote is that the "opposing brigade forces" were United States and NATO units. If the 101st could do that, we must assume that the threat can do the same.

As can be seen, the Army does not have the assets demanded by our current tactical doctrine. We are forcing commanders to become overreliant on radios and not allowing them to prepare their units for operations in an electronic warfare intensive environment. This lack

of training could cause them to arrive on the next battlefield inadequately prepared. Being aware of the shortcomings of each system and training accordingly reduces the impact of each individual shortcoming and increases the commander's chances of winning the first battle. y commander is prone to defeat, whatever his strength in numbers and weapons, if EW [electronic warfare] denies him the means to convey orders, provide for fire support, or to arrange for logistics and administration."<sup>28</sup>

The best summary for this section is a statement from FM 25-2 (TEST):<sup>29</sup>

Communication means usually available to units are radio, wire, messenger, visual, and sound. The composition of the means in each unit is limited by the men, equipment, and transportation provided by the TOE and the unit or higher commander. The various means have different capabilities and limitations. They are used to complement each other: entire dependence must not be placed on any one means.

#### Traffic Control

In Vietnam there was little need for traffic control because of the extensive use of helicopters, the relatively few tank and mechanized units, the lack of enemy air and artillery, and the continual use of the radio. In training, large numbers of vehicles are rarely forced to use a small number of roads on short notice. Large-scale moves are carefully planned, and delays are blamed on peacetime regulations and the desire not to cause maneuver damage. In future wars, we may not have the advantages we had in Vietnam. Nor will the peacetime excuses work. Not only will many units be trying to use the roads, but commanders and

couriers will be moving from headquarters to headquarters. Refugees will clog the roads, and the wounded will be moving to the rear. Compounding this problem will be the requirement for units to stay dispersed and move under radio silence.

A British report on traffic control during the Italian Campaign in World War II states: "Road movement has at times been a very serious problem. During combat operations traffic blocks are easily formed, and have very serious consequences on the battle."<sup>30</sup> It also states that proper control of road movement is a battle-winning factor and a measure of the efficiency of the moving headquarters.<sup>31</sup>

A Combat Lessons Report issued by the 2d Armored Group in July 1944 states:

When tank units move behind the lines, traffic control agencies must maintain traffic discipline. Many roads that are normally considered two-way in reality become one-way. Congestions, delay and traffic jams have often resulted from the failure of traffic control agencies to maintain control of casual motor and pedestrian traffic on a section of road over which armored units have been given clearance.<sup>32</sup>

The ability of traffic control agencies to perform effectively is determined by their relative mobility in relation to the elements being controlled. If they are roadbound or unable to keep up with the supported unit, they could be ineffective at a critical time. This position is supported by a study conducted in 1963 by the Military Police Combat Developments Agency which states:

. . . efficiency and timely accomplishment of the traffic control function requires [sic] an operational effectiveness of the military police which will be achievable only if these units are provided

with a ground mobility exceeding that of the supported unit.\*<sup>33</sup>

Based on this statement and the fact that military police units control traffic within the Army, a review was made of divisional military police TOEs to determine the types of vehicles assigned for the traffic control function. The units checked were:

- Military police company, airmobile division (TOE 19-87H).<sup>34</sup>
- Military police company, airborne division (TOE 19-67H).<sup>35</sup>
- Military police company, armored, infantry and mechanized infantry divisions (TOE 19-27H).<sup>36</sup>
- Military police company, heavy division (Division Restructuring Study) (TOE 19-827T700).<sup>37</sup>

The results of this review indicated that the 1/4-ton and 3/4-ton trucks are the organic vehicles these units use for traffic control. Unfortunately, these vehicles do not have the ground mobility called for in the Military Police Combat Developments Agency study.<sup>38</sup> This shortcoming in these vehicles has been recognized, because the same study, referring to the 1/4-ton and 3/4-ton trucks, states:

These vehicles are essentially roadbound and lack required versatility. To achieve a mobility capability commensurate with that of elements being supported, it is therefore mandatory that the military police be given a reliable off-road capability.<sup>39</sup>

This study is replete with comments about the need for a mobility capability, to include an off-the-road capability, that exceeds that

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\*FM 101-5, Staff Officers Field Manual: Staff Organization and Procedure, assigns the military police traffic control responsibility in the US Army.<sup>40</sup>

of tactical units. At no time, however, does it discuss vehicles in general to determine which would be the most effective as a traffic control vehicle. It merely states that the military police need the M114, which was believed to meet their mobility needs.<sup>41</sup> Major For t S. Chilton IV, a Military Police officer in the US Army Command and General Staff College, Class of 1976-77, in discussing the M114, stated: "We had them and they proved ineffective for the purpose of traffic control because they didn't give us the extra mobility we needed."<sup>42</sup>

Proof that the problem still exists is the 1st Infantry Division's after action report from REFORGER, 1972, which states that movement of its units was hampered by bad weather and the high density of traffic at the end of the maneuver. Fortunately, the problem was recognized, but the proposed solution was to develop a better movement plan, request 60 additional military policemen (already 30 above division authorization), and keep some of the units in the field a day longer the next year to reduce the amount of traffic.<sup>43</sup> The division failed to see the critical flaw in its command and control capability. If it had trouble controlling its units in a peacetime environment, how does it expect to do so when the shooting starts and when it is moving under radio silence?

A 1944 report by an English tactical unit states that the number of personnel assigned to the TOE for the traffic control function was inadequate and that until it was altered commanders would have to improvise and take personnel and equipment away from other units to

supplement the military police. This report also says that it learned from experience that the peacetime system did not work and it had to develop its own system to meet the demands of combat. The backbone of the system was the traffic post, which had two motorcycles assigned patrolling.<sup>44</sup>

Demonstrating that the motorcycle may have potential as a messenger and traffic control vehicle are the results of a study conducted among the Allied Officers assigned to Fort Leavenworth, Kansas, during the 1976-77 academic year of the US Army Command and General Staff College (see the appendix). Participating in the survey was one officer from each of the 50 nations represented. Of those questioned, 47 (94%) indicated that their armies use motorcycles. Review of the results indicates that 84% of the countries using motorcycles use them for messenger duty and 98% use them for traffic control.

#### Summary

This chapter indicates that there is a potential need in the US Army for the motorcycle and that the motorcycle may be suitable as a messenger and traffic control vehicle. Has the Army investigated the use of the motorcycle for these tasks? This question is answered in Chapter IV, which discusses the current status of motorcycle development in the Army.



## CHAPTER IV

### US ARMY TESTING AND EVALUATION OF THE MOTORCYCLE FROM THE MASSTER MILITARY POTENTIAL TEST

The historical review in Chapter I revealed that the early motorcycle was unsuited as a military vehicle and eventually removed from the inventory. It was shown in Chapter II that the shortcomings of the early motorcycle have been eliminated in the modern motorcycle. The motorbike potential test concluded that

the motorbike can maneuver with more stealth than any other ground vehicle. It is rugged, requires a low order of operator and maintenance skills, is easily transportable in conventional Army aircraft, and requires a minimum of petroleum, oil, and lubricants (POL).<sup>1</sup>

To this point this study has demonstrated that the motorcycle has definite military potential. This chapter is an examination of US Army testing and evaluation of the motorcycle from the Modern Army Selected System Test, Evaluation and Review (MASSTER) test in 1972 to date.

#### Official Motorcycle Development Sequence

January 1972: MASSTER contracted for 33 motorcycles to conduct an in-house motorcycle employment evaluation. The purpose of the testing was to determine the potential of motorcycles to enhance the reconnaissance, security, and antitank capabilities of the US Army.<sup>2</sup>

July 1972: The US Army Combat Developments Command Infantry

Agency conducted a study to determine possible uses of the motorcycle within the Army. Its conclusion was that utilizing motorcycles in infantry battalions is feasible. The report also provided a tentative basis of issue that called for the motorcycle to be added to the following units:<sup>3</sup>

Reconnaissance/scout platoon, infantry battalion (TOE 7-28H)  
13 motorcycles

Reconnaissance platoon, airborne infantry battalion (TOE 7-38H)  
15 motorcycles

Scout platoon, mechanized infantry battalion (TOE 7-48H)  
11 motorcycles

Reconnaissance platoon, airmobile infantry battalion (TOE 7-58H)  
15 motorcycles

October 1972: The US Army Combined Arms Combat Development Activity (CACDA) was tasked by Department of the Army to conduct an evaluation of the motorcycle, using as a basis "studies and tests completed by various commands and agencies, to determine the requirements for and potential of the motorcycle for improving combat effectiveness."<sup>4</sup>

December 1972: The US Army Combat Developments Command Communication-Electronics Agency requested that CACDA conduct tests to determine the feasibility of using the motorcycle for messenger duty. The agency also identified several specific areas it believed should be tested.<sup>5</sup>

January 1973: MASSTER completed its testing and published a proposed required operational capability (ROC) and a tentative basis of

issue (BOI) (see Table 1, page 15) in addition to the following statement:\*

The motorcycle can make a significant contribution to the commander that cannot be provided within the current table of organization and equipment (TOE) structure.<sup>6</sup>

The MASSTER recommendations were that the basis of issue be approved and that the motorcycle with the materiel characteristics listed in the ROC be procured for the units listed in the BOI study.<sup>7</sup>

March 1973: CACDA received the Infantry Agency and Armor Agency study it directed in November 1972 to develop the recommended Combat Developments Command (CDC) position on the MASSTER test.<sup>8</sup>

1. The Infantry Agency recommended that:<sup>9</sup>

a. The CDC accept the test results MASSTER outlined and continue testing the motorcycle for application within the force structure of the Army.

b. A working group should be organized to prepare a motorcycle ROC for incorporation into the materiel acquisition cycle.

2. The Armor Agency concurred with the above Infantry Agency position and identified the following potential motorcycle shortcomings that should be addressed in future MASSTER testing:

a. Ability of the operator to observe while moving

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\*ROC--A document that describes the minimum-essential operational, technical, logistical, and cost information required for a HQDA decision to pursue acquisition of a system. It is a formal military need statement and, when approved by HQDA, becomes a commitment to develop the system.

- b. Problems of operating on ice and snow
- c. Problems of crossing water obstacles
- d. Restricted use of individual weapon
- e. Lack of load-carrying capacity
- f. High accident rate in a combat environment

The Armor Agency also believed that the ROC needed more work and recommended "that a joint working group be formed consisting of representatives from MASSTER, the Infantry, Armor, and Military Police communities, and Army Materiel Command to review" the MASSTER ROC "and prepare a new draft ROC that will satisfy the guidelines listed in the Materiel Acquisition Process."<sup>10</sup>

3. The Military Police Agency concurred with the above Infantry Agency position and requested that future testing of the motorcycle include an evaluation of its potential in military police operations. In addition to the military police units identified in the BOI study, the Military Police Agency also identified other military police units (TOE 19-77G and TOE 19-97G) which have a need for motorbike assets.<sup>11</sup>

4. Ten additional agencies concurred with the Infantry Agency position that the MASSTER test results should be accepted and that a ROC be prepared for incorporation of the motorcycle into the materiel acquisition cycle.<sup>12</sup> They were:

- Army Aviation Agency
- Engineer Agency
- Field Artillery Agency
- Intelligence Agency
- Medical Service Agency
- Supply Agency

- Transportation Agency
- Chemical, Biological, Radiological Agency
- Intelligence Combat Support Group
- Personnel Administration Logistic Supply Group

July 1973: After receipt of the above reports from the Infantry and Armor Agencies, CACDA submitted the following report through TRADOC to Department of the Army:

The motorbike has potential for tactical and administrative missions under certain circumstances; however, no specific user requirement has been identified and there is insufficient information available to warrant development and fielding of a motorbike at this time without further evaluation and testing by appropriate schools and FORSCOM [US Army Forces Command] Units. . . . [It is recommended] that approval of a ROC for the motorbike be deferred pending determination of a valid requirement and further evaluation.<sup>13</sup>

The CACDA report also stated: "Judgment also identifies some problem areas that must be considered." These areas were "limited cargo capacity, driver safety and training, operation on slick or icy roads, and driver comfort in cold weather."<sup>14</sup>

June 1974. Department of the Army approved the CACDA recommendations and directed the following actions:

This testing [of the motorcycle], which was MASSTER-initiated and has been in progress for some time, should be completed or terminated as soon as practicable. . . .

Considerable testing to date of motorcycles . . . has revealed that they hold some potential for military use. Further tests to demonstrate "potential," therefore, are not required. The thrust of future testing should be to generate hard field data required to form the basis for a decision on whether a ROC should be established. . . . TRADOC [US Army Training and Doctrine Command], therefore, should develop a test plan, to be executed . . . that addresses the hard questions that need to be answered.<sup>15</sup>

July 1974: In response to a directive from TPADOC to "conduct necessary analysis and, if appropriate, develop test plans designed to determine whether a Required Operational Capability (ROC) is needed for the motorbike,"<sup>16</sup> CACDA tasked all schools and centers to "define the . . . requirement (if any), basis of issue and vehicle trade-offs for motorbikes."<sup>17</sup> These requirements, along with the results of two 30-day user evaluations, would be evaluated in an attempt to produce the "hard field data" Department of the Army requested.

## 1. User evaluations

### a. 82d Airborne Division (July 1974)<sup>18</sup>

(1) "Motorbikes were effective when employed in reconnaissance and messenger roles."

(2) "The motorbike [should] be included in appropriate TOE's as a reconnaissance and/or messenger vehicle."

### b. 101st Airborne Division (Air Assault) (August 1974):

"The 185cc Suzuki Trail Bike was judged to be excessively noisy and unsuitable for any but a very limited role in the Airmobile Division."<sup>19</sup> Three months later, however, the 101st Airborne Division submitted a ROC to CACDA requesting that the motorcycle be added to its TOE (see October 1974).

## 2. Requirement by schools

a. The Armor School (USAARMS) stated it had just completed an extensive in-depth analysis of armored cavalry/scout operations. This study indicated that 51 motorcycles would be required for each

armored cavalry squadron and 10 per scout platoon organic to a tank or mechanized infantry battalion. It also stated that to define a basis of issue prior to testing the proposed organization would be premature.<sup>20</sup>

b. The Infantry School (USAIS) stated that there were indications of a potential need for improved mobility in selected infantry units and identified the scout squad of the airmobile infantry battalion, which is currently footmounted. It also stated that it supported additional testing of the motorcycle.<sup>21</sup>

c. The Signal School (USASIGS) stated that "the addition of a flexible, highly mobile courier vehicle such as a motorbike for the movement of critical operational/intelligence related documents would provide additional depth to a tactical communications system." The USASIGS also recommended that tests be conducted to determine the potential of the motorbike as a messenger vehicle. The USASIGS stated: "Identification of basis of issue and vehicle trade-off are contingent upon results of testing and subsequent analysis."<sup>22</sup>

d. The Military Police School (USAMPS)<sup>23</sup> stated that the motorcycle appeared to offer potential for enhancing the following military police operations:

- (1) Route and area reconnaissance
- (2) Traffic and circulation control
- (3) Convoy escort and security
- (4) Installation security operations
- (5) Airborne or airmobile operations

(6) River-crossing operations

(7) Passage of lines operations

The letter from USAMPS also contained input for future motorcycle potential tests. In reference to the military police units addressed in the MASSTER basis of issue study (see Table 1, page 15), the USAMPS wrote: "In addition to the MP [military police] units identified in the BOI study (MASSTER), this Agency has identified other military police units which may have a greater need for motorcycle assets. . . . TOE 19-77G and TOE 19-97G." The USAMPS also provided a basis of issue and vehicle trade-off for the motorcycle. An example of one of the six units listed is:

Military Police Company, Airmobile Division (TOE 19-87H).

- a. Trade off one 1/4-ton truck for three motorcycles in each of the nine MP squads.
- b. Add one motorcycle to each of the four security squads.

October 1974

1. After analyzing the above user evaluations and school requirements, an Action Paper on Requirements Validation for Motorcycles was prepared and signed by the Director, Combat/Combat Support Systems of the Combined Arms Combat Development Activity, Fort Leavenworth, Kansas, giving the following CACDA position on further motorcycle development:

The USAIS, USAMPS, and USASIGS have indicated a potential for the motorbike but did not express an essential requirement.

The USAARMS has identified an essential requirement for



motorcycles in the Cavalry/Scout Study and should prepare the necessary requirement documents when . . . testing is complete.<sup>24</sup>

(Comment: It has been three years since this statement was made. The testing was completed in 1975 and the results were favorable. However, a requirements document for a light scout motorcycle has not been submitted.)

2. The 101st Airborne Division (Air Assault) submitted a ROC on the "airmobile motorbike" stating:

The PROC [Proposed Required Operational Capability] for an Airmobile Scout Motorbike . . . has been developed based on the requirements of the Airmobile Division. It is believed, however, that motorbikes of this type have application in other type units in roles not identified in attached requirement documents.<sup>25</sup>

December 1974: Major General Wolfe, Commander, CACDA, sent the following message to Major General Tarpley, Commandant, USAIS, and Major General Starry, Commandant, USAARMS:

Subject: Validation of Motorbike Requirements

1. Since 1972 we have been attempting to determine if there is a US Army requirement for motorbikes. Our attempts have met with various replies indicating an existing military potential but not a validated requirement.

2. Our most recent attempt to define motorbike requirements was sent to the schools and centers on 25 Jun 74. Their replies indicate either no requirement for the motorbike or that there exists only a potential for the motorbike in the scout squads of air assault infantry battalions, and the USAARMS reply referenced the "Cavalry/Scout Study" where motorbikes are recommended in the preferred Cavalry organization.

3. Recently we received for action a copy of a motorbike Required Operational Capability (ROC) initiated by the CG, 101st Airborne Div (Air Assault) and concurred in by CDP, AFSCOM. In view of our past responses pertaining to this requirement, I hesitate to process this ROC further until we have identified a

definite requirement for motorbikes from our associated schools.

4. I have written MG McEnery a letter briefly explaining the motorbike audit trail, and suggesting that he discuss the matter with MG Tarpley. If these implied requirements can be validated by the proponent schools, CAC [CACDA] will support them and will have the development documents validated.

5. I believe it is time for us to come down hard on this problem and would appreciate your views, if possible, by 15 Dec 74.<sup>26</sup>

January 1975

1. CACDA forwarded the 101st Airborne Division ROC to the Infantry School for finalization or alteration.<sup>27</sup>

2. FORSCOM forwarded a recommendation for the use of motorcycles to TRADOC with the following comments:

1. Proposal contained in basic letter has been reviewed by this headquarters (FORSCOM) and appears to have merit. It is forwarded for your review and evaluation as a matter within your purview.

2. Proper employment of motorcycles could enhance battlefield reconnaissance and intelligence collection. Advantages a motorcycle would have over present US Army reconnaissance vehicles are as follows:

- a. Low initial and operating cost.
- b. Relatively easy to camouflage.
- c. Greater cross-country mobility, especially in wooded areas.
- d. Easily air dropped.
- e. Long cruising range on minimal fuel supply.
- f. Small and undefined silhouette.
- g. Minimum disruption of terrain traversed.
- h. Minimal noise and ground vibrations.

3. History supports the use of motorcycles as reconnaissance vehicles. Currently, the Warsaw Pact forces are utilizing motorcycles for this purpose.<sup>28</sup>

3. TRADOC forwarded the FORSCOM indorsement to CACDA on 28 January 1975.<sup>29</sup>

March 1975: The 6th Cavalry Brigade (Air Combat), Fort Hood, Texas, developed a ROC for a military motorcycle and stated:

Extensive testing of the motorbike with air cavalry units at Fort Hood over the past three years has proven that motorbikes are a valuable asset to these units in the performance of all reconnaissance and security missions. They provide a relatively inexpensive means of providing additional mobility to air cavalry units which is an essential asset in the performance of reconnaissance and security missions. This is especially true during periods of reduced visibility or enemy activity which might limit the use of pure aeroscout assets to perform these functions.<sup>30</sup>

July 1975: A Joint Working Group met at Fort Benning, Georgia, to "define the requirements (if any) and provide a basis of issue for motorbikes in infantry proponent TOE."<sup>31</sup> Agencies represented at the meeting were:

- 6th Cavalry Brigade (Air Combat)
- US Army Armor Center
- US Army Combined Arms Combat Development Activity
- US Army Infantry School
- US Army Ordnance Center and School
- US Army Tank-Automotive Command

(Comment: Because of the low procurement cost of the motorcycle, a Letter Requirement was determined to be the appropriate requirements document rather than a ROC (per AR 1000-1).)<sup>32</sup>

November 1975: The Infantry School forwarded a draft Letter Requirement through CACDA to TRADOC. One of the comments in the letter was:

The lack of ground mobility in the scout platoon of the airmobile and light infantry battalions has been identified as a critical operating deficiency. These scout platoons have no organic ground transportation and must perform their reconnaissance mission on foot. . . . In the highly fluid battlefield projected for future mid and high intensity movement, the motorcycles would greatly extend the area that the scout platoon could successfully reconnoiter in a given period of time.<sup>33</sup>

This requirements document called for a motorcycle that weighed between 250 and 300 pounds.<sup>34</sup> Other requirements documents called for the following weights:

- MASSTER's ROC--"not to exceed 250 pounds"<sup>35</sup>
- 101st Airborne Division ROC--"not to exceed 250 pounds"<sup>36</sup>
- 6th Cavalry Brigade ROC--"not to exceed 250 pounds with full POL"<sup>37</sup>

November 1976: TRADOC forwarded the Infantry School Letter Requirement to the US Army Materiel Development and Readiness Command (DARCOM) for review and approval.<sup>38</sup>

January 1977: Department of the Army approved a Letter Requirement for testing the motorcycle for possible inclusion in the following units:<sup>39</sup>

- Scout platoon, airmobile and light infantry battalion.
- Armored cavalry platoon, armored cavalry regiment/armored cavalry squadron (conceptual).

• Reconnaissance squads, air cavalry troop, air cavalry combat brigade.

February 1977: Department of the Army directed DARCOM to procure nine motorcycles, with the characteristics called for in the Letter Requirement, for testing at Fort Campbell, Kentucky, in June 1977.

Testing will be conducted by the Infantry School, using 101st Airborne Division (Air Assault) personnel.<sup>40</sup>

The purpose of the test is to "provide data and associated analysis on the training and logistical implications and operational utility of a motorcycle when employed by airmobile scout units." The objectives of the test are:<sup>41</sup>

- To assess the contractor's training program for training personnel to operate the scout motorcycle.

- To assess the utility of the motorcycle as a means of providing mobility for the Dragon system in the air assault infantry battalion.

- To assess the maintenance requirements for the motorcycle and the impact these requirements have on the maintenance capabilities of the air assault infantry battalion.

- To obtain data on the operational effectiveness of scout platoons equipped with the motorcycle.

- To collect and evaluate operational reliability, availability, and maintainability.

- To assess the adequacy of proposed logistical concept.

- To provide information upon which to assess operator and

maintenance training, human factors, and safety implications associated with the motorcycle.

- To provide information to help assess the vulnerability of the motorcycle to visual and audio acquisition.

This test is not scheduled to include any of the testing requested by the Military Police School or the Signal School. Nor is the motorcycle being tested (a 340cc) the same size that the Armor School believes will be appropriate for use as a scout motorcycle (125cc to 185cc).<sup>42</sup>

#### Other Testing and Evaluation of the Motorcycle

Besides the above events that led to the official test to be conducted at Fort Campbell, many other attempts have been made or will be made to test or evaluate the military potential of motorcycles. Five of these attempts are briefly discussed below.

April 1975: The 2d Battalion of the 504th Infantry, 82d Airborne Division, conducted an in-house test during Field Training Exercise SUPER QUICK I and Command Post Exercise LABEL MATRICKS at Fort Bragg, North Carolina. During these exercises the battalion used privately owned motorcycles to test the concept of employing motorcycles as messengers and reconnaissance/surveillance team transportation. In the opinion of the battalion's S3, "the motorcycle was an extremely valuable asset as a messenger vehicle but was unsatisfactory as a reconnaissance and surveillance team vehicle" because riders were unable to infiltrate the airhead through aggressor positions.<sup>43</sup>

December 1976: The US Army Armor and Engineer Board began a tank-mounted motorcycle test to explore uses for motorcycles by tank platoon leaders in an attempt to evaluate the potential uses of the motorcycle as auxiliary transportation and its impact on training, tactics, and maintenance in tank elements so equipped.<sup>44</sup> To date no findings have been published, but the results have indicated that the motorcycle is effective when used for this purpose.<sup>45</sup>

January 1977: The Division Restructuring Evaluation Office (DREO) was formed at Fort Leavenworth, Kansas, to integrate the efforts of all Army elements in an effort to determine and recommend the most effective division structure for maximizing the efficiency of the latest doctrine, tactics, and hardware. As of this date, four TOEs of the restructured division call for motorcycles.<sup>46</sup> They are:

- Scout Section, Brigade Headquarters and Headquarters Company, Heavy Division, TOE 17-942 T 700 (1 motorcycle per section, 2 total).
- Ground Troop, Armored Cavalry Squadron, Heavy Division, TOE 17-925 T 700 (6 motorcycles per troop, 18 total).
- Scout Section, Headquarters and Headquarters Company, Armor Battalion, TOE 17-936 T 720 (3 motorcycles). Only one armor battalion in the division is scheduled to have motorcycles in its TOE.
- Communication Platoon, Headquarters and Headquarters and Headquarters Company, Division Artillery, TOE 06-902 T 700 (2 motorcycles).

This would call for a total of 29 motorcycles in the

restructured division. Testing of these proposed organizations is scheduled to begin in April 1978 for TOE 17-925 T 700 and in October 1978 for TOE 17-942 T 700, TOE 17-936 T 720, and TOE 06-902 T 700.

#### February 1977

1. TRADOC asked all divisions, centers, and schools if there is a need for the motorcycle as an alternate means of communications. As of this date there appears to be some support for the idea. The Armor, Field Artillery, Infantry, and Signal Schools, the Air Defense Command, FORSCOM, the XVIII Airborne Corps, and the 4th and 9th Infantry Divisions have responded favorably.<sup>47</sup>

2. The commander of the United States Army, Europe, approved a V Corps request to reorganize the 3d Squadron of the 8th Cavalry, 8th Mechanized Infantry Division, along the lines of the new conceptual cavalry concept. This in-house reorganization, which adds 10 motorcycles to each cavalry troop, is to serve as a case study for future reorganization and to test the potential of the motorcycle in cavalry operations.<sup>48</sup>

3. The 8th Mechanized Infantry Division also received approval to purchase locally 30 motorcycles for in-house testing. The test is being conducted to determine the potential of motorcycles as a traffic control/messenger vehicle in the European environment.<sup>49</sup>

#### Summary

A review of the actions covered in this chapter indicates a disjointed but continuous effort in the area of motorcycle development.



The recommendations in Chapter V address the matter of a coordinated program for motorcycle development in the US Army.

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Summary

This paper has described the use and testing of the motorcycle by the US Army from April 1917 to February 1977. During World War I, there were about 10,000 motorcycles in the Army inventory.<sup>1</sup> In the pre-World War II period, the Army found the motorcycle unsuitable as a tactical vehicle because it could not operate effectively off the road and was mechanically unreliable. For this reason, major procurement ceased, and the motorcycle saw only limited use during World War II.<sup>2</sup> This was not the case with the German Army, which developed a motorcycle that performed successfully off the road. During the course of World War II, the German Army went from 3 to 20 motorcycle infantry battalions.<sup>3</sup>

Following World War II civilian industry developed an excellent, lightweight motorcycle<sup>4</sup> that became popular as a cross-country endurance racing vehicle. It became obvious to the military that this motorcycle had potential as a tactical vehicle. Consequently, the Modern Army Selected System Test, Evaluation and Review (MASSTER) began testing the military potential of this motorcycle in January 1972.<sup>5</sup> MASSTER concentrated on the obvious potential of the motorcycle as a scout vehicle but

did not investigate other possible uses in any detail.<sup>6</sup> However, the recommended basis of issue (BOI) developed by MASSTER did call for inclusion of the motorcycle in military police TOEs,<sup>7</sup> but there was insufficient testing to support this recommendation.

The Combined Arms Combat Development Activity (CACDA) coordinated the analysis of the MASSTER test and concluded: "No specific use requirement has been identified and there is insufficient information available to warrant development and fielding at this time."<sup>8</sup> Department of the Army concurred with the CACDA position but, acknowledging the military potential of the motorcycle, directed further testing.<sup>9</sup> In response to this directive, the 82d and 101st Airborne Divisions were tasked to field-test the motorcycle,<sup>10</sup> while all schools were directed to identify their requirements (if any) for the motorcycle.<sup>11</sup>

The field-testing resulted in requests for the motorcycle by both the 82d and 101st Airborne Divisions. The 101st Airborne Division was to submit a required operational capability (ROC)<sup>12</sup> three months later, and the 82d Airborne Division recommended that the motorcycle "be included in appropriate TOE's as a reconnaissance and/or messenger vehicle."<sup>13</sup> The Commanding General, XVIII Airborne Corps, concurred with this recommendation.<sup>14</sup>

The requirements identified by the schools were as follows:

- The Military Police School identified specific requirements and provided CACDA with a list of TOEs requiring motorcycles and proposed vehicle trade-offs.<sup>15</sup>

- The Signal School stated that the addition of the motorcycle for "the movement of critical operational/intelligence related documents would provide added depth to a tactical communication system" but that further testing and analysis would be required to identify a basis of issue and vehicle trade-off.<sup>16</sup>

- The Infantry School position was that "there are indications of potential need for improved ground mobility with select infantry organizations" and "a motorbike-type vehicle may offer the desired capability." An example cited was that "the scout squads of the air-mobile infantry battalions have no means of ground transportation to perform their reconnaissance missions."<sup>17</sup> The Infantry School also stated: "Specific requirements (required operational capability) have not been identified at this time, but may emerge as . . . evaluation continues." Further, it said it supported additional testing and evaluation. In January 1975 the Infantry School identified a firm requirement for two TOEs.<sup>18</sup>

- The Armor School (USAARMS) identified specific requirements but stated that a basis of issue would be premature without additional testing.<sup>19</sup>

In October 1974, CACDA, when evaluating the above tests and requirements, overlooked the recommendation by the 82d Airborne Division and the requests by the Military Police School and the Signal School when it said:

The results of the request for user motorbike requirements have been

analyzed. No hard user requirement was identified. The USAARMS stated in their reply that motorbikes were recommended for use in their proposed cavalry organization [but additional testing was required].<sup>20</sup>

In November 1974 the 101st Airborne Division submitted its ROC,<sup>21</sup> and it was followed by one from the 6th Cavalry Brigade (Air Combat) four months later.<sup>22</sup>

In July 1974 a joint working group met at Fort Benning to "consolidate" these ROCs into one letter requirement (LR)\* for the development of a scout motorcycle.<sup>23</sup> In retrospect, three aspects of this joint working group should be pointed out.

- As shown in Chapter IV, the motorcycle called for in the LR is heavier than any of the motorcycles previously tested or requested (as much as 20% heavier).

- Even though the Military Police School had requested that the motorcycle be added to selected military police TOEs, it was not invited to participate in the meeting to develop the LR for a military motorcycle.<sup>24</sup>

- Even though the Signal School had repeatedly requested that the potential of the motorcycle as a messenger vehicle be tested, it was not invited to participate in the meeting.<sup>25</sup>

### Conclusions

In conclusion:

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\*The LR was selected as the proper procurement document as opposed to a ROC because of the low procurement cost of the motorcycle.

- The motorcycle appears suited for three military tasks: messenger vehicle, traffic control vehicle, and scout transporter.

- Testing of the motorcycle to determine its overall potential and capability to fill Army requirements has been poorly coordinated

- a. Messenger vehicle--The motorcycle is well suited for this task. It has been used successfully in previous wars,<sup>26</sup> is presently being used for this task by numerous armies (see the appendix), and has been requested by the Signal School.<sup>27</sup> However, this potential use appears to have been ignored by CACDA.<sup>28</sup>

- b. Traffic control--The motorcycle is well suited for this task. It has been used successfully in previous wars,<sup>29</sup> is presently being used by numerous armies (see the appendix), and has been requested by the Military Police School.<sup>30</sup> However, this potential use has been ignored by CACDA.<sup>31</sup>

#### Recommendations

This writer recommends:

- That the suitability of the motorcycle to perform messenger and traffic control tasks be acknowledged and integrated into further testing and evaluation by CACDA and the Infantry School.

- That further testing and evaluation consider the extensive motorcycle experience gained by foreign armies in type motorcycle used, organization, maintenance, and training.

In a time of rising costs for increasingly complex tactical vehicles and their fuel, the motorcycle offers a proven and economical

answer to some military requirements. The US Army must recognize that the day of the motorcycle has come. To delay it longer only postpones the inevitable and increases the eventual cost to the Army.

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## ENDNOTES

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APPENDIX: SURVEY OF MOTORCYCLE USAGE  
BY FOREIGN COUNTRIES

| Country and Respondee              | Does Your Army Use Motorcycles<br>As Or For: |                                       |                     |
|------------------------------------|--|---------------------------------------|---------------------|
|                                    | Messenger<br>Vehicles                        | Traffic<br>Control/Escort<br>Vehicles | Recon-<br>naissance |
| Afghanistan<br>MAJ Mohammad Aman   | Yes  | Yes                                   | No                  |
| Australia<br>LTC P. J. Pearson     | Yes  | Yes                                   | No                  |
| Bahrain<br>CPT Ahmad S. Al-Khalifa | Yes  | Yes                                   | No                  |
| Belgium<br>CPT Joris Uytterhoeven  | Yes  | Yes                                   | No                  |
| Brazil<br>LTC Luiz G. S. Lessa     | Yes  | Yes                                   | No                  |
| Canada<br>LTC D. G. Hanson         | Yes  | Yes                                   | No                  |
| China<br>LTC Twu An-tu             | Yes  | Yes                                   | No                  |
| Colombia<br>LTC Augusto Rodriguez  | Yes  | Yes                                   | Yes                 |
| Denmark<br>MAJ Benn Bak            | Yes  | Yes                                   | No                  |
| Finland<br>LTC Matti I. Haapalinna | Yes  | Yes                                   | No                  |
| France<br>LTC P. A. Jeandel        | Yes  | Yes                                   | No                  |
| Germany<br>MAJ Winfried Dunkel     | Yes  | Yes                                   | No                  |
| Ghana<br>MAJ Innocent Kpeto        | Yes  | Yes                                   | No                  |

## APPENDIX--Continued

| Country and Respondee    | Does Your Army Use Motorcycles<br>As Or For: |                                       |               |
|--------------------------|--|---------------------------------------|---------------|
|                          | Messenger<br>Vehicles                        | Traffic<br>Control/Escort<br>Vehicles | Rec<br>naissa |
| Great Britain            |  |                                       |               |
| MAJ John S. Crawshaw     | Yes  | Yes                                   | No            |
| Greece                   |  |                                       |               |
| MAJ Christos Davos       | Yes  | Yes                                   | No            |
| Guatemala                |  |                                       |               |
| LTC Alvaro Barahona      | Yes  | No                                    | No            |
| India                    |  |                                       |               |
| LTC Konzettora Chengappa | Yes  | Yes                                   | No            |
| Indonesia                |  |                                       |               |
| LTC Ali Rosjidi          | Yes  | Yes                                   | No            |
| Iran                     |  |                                       |               |
| MAJ Heshmatollah Zamni   | Yes  | Yes                                   | No            |
| Israel                   |  |                                       |               |
| LTC Yoram S. Yair        | No   | Yes                                   | No            |
| Italy                    |  |                                       |               |
| CPT Raffuello Graziani   | Yes  | Yes                                   | No            |
| Japan                    |  |                                       |               |
| LTC Mitsuhiro Saino      | Yes  | Yes                                   | Yes           |
| Jordan                   |  |                                       |               |
| CPT Lutfi Ibrahim        | Yes  | Yes                                   | No            |
| Kenya*                   |  |                                       |               |
| MAJ Benjamin Nganda      |  |                                       |               |
| Korea                    |  |                                       |               |
| MAJ Tae Hee Kim          | No   | Yes                                   | No            |
| Kuwait                   |  |                                       |               |
| LTC Mohammed Akbar       | Yes  | Yes                                   | No            |
| Liberia*                 |  |                                       |               |
| COL Mansfield Yancy      |  |                                       |               |
| Malaysia                 |  |                                       |               |
| MAJ Amin Hashim          | Yes  | Yes                                   | No            |



## APPENDIX--Continued

| Country and Respondee                         | Does Your Army Use Motorcycles<br>As Or For: |                                       |                     |
|---|--|---------------------------------------|---------------------|
|   | Messenger<br>Vehicles                        | Traffic<br>Control/Escort<br>Vehicles | Recon-<br>naissance |
| Nepal<br>MAJ Bhuban Shah                      | Yes  | Yes                                   | No                  |
| New Zealand<br>MAJ John A. Dessistoun-Wood    | No   | Yes                                   | No                  |
| Nicaragua<br>MAJ Melville Hodgson             | No   | Yes                                   | No                  |
| Nigeria<br>MAJ Daniel P. Archibong            | Yes  | Yes                                   | No                  |
| Norway<br>MAJ Ola Aabakken                    | Yes  | Yes                                   | No                  |
| Pakistan<br>MAJ Najeeb Ahmed                  | Yes  | Yes                                   | No                  |
| Peru*<br>MAJ Alberto Arciniega                |  |                                       |                     |
| Philippines<br>COL Mariano P. Adalem          | No   | Yes                                   | No                  |
| Portugal<br>MAJ Luis S. Vicente               | Yes  | Yes                                   | No                  |
| Saudi Arabia<br>LTC A. Abdulaziz Al Suhaibani | Yes  | Yes                                   | No                  |
| Singapore<br>LTC Patrick Choy                 | Yes  | Yes                                   | No                  |
| Spain<br>MAJ Francisco Agudo                  | No   | Yes                                   | No                  |
| Switzerland<br>MAJ Alain DeRougemont          | Yes  | Yes                                   | No                  |
| Thailand<br>LTC Arwot Vipartapan              | No   | Yes                                   | No                  |
| Tunisia<br>MAJ Larbi Youssef                  | Yes  | Yes                                   | No                  |

APPENDIX--Continued

| Country and Respondee       | Does Your Army Use Motorcycles<br>As Or For: |                                       |                  |
|-----------------------------|--|---------------------------------------|------------------|
|                             | Messenger<br>Vehicles                        | Traffic<br>Control/Escort<br>Vehicles | Rec<br>naissance |
| Venezuela<br>LTC Edgar Leon | Yes  | Yes                                   | No               |
| Zaire<br>CPT Ungeyi Udjanga | No   | Yes                                   | No               |

\*Kenya's Army, Liberia's Army, and Peru's Army do not use motorcycles.

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